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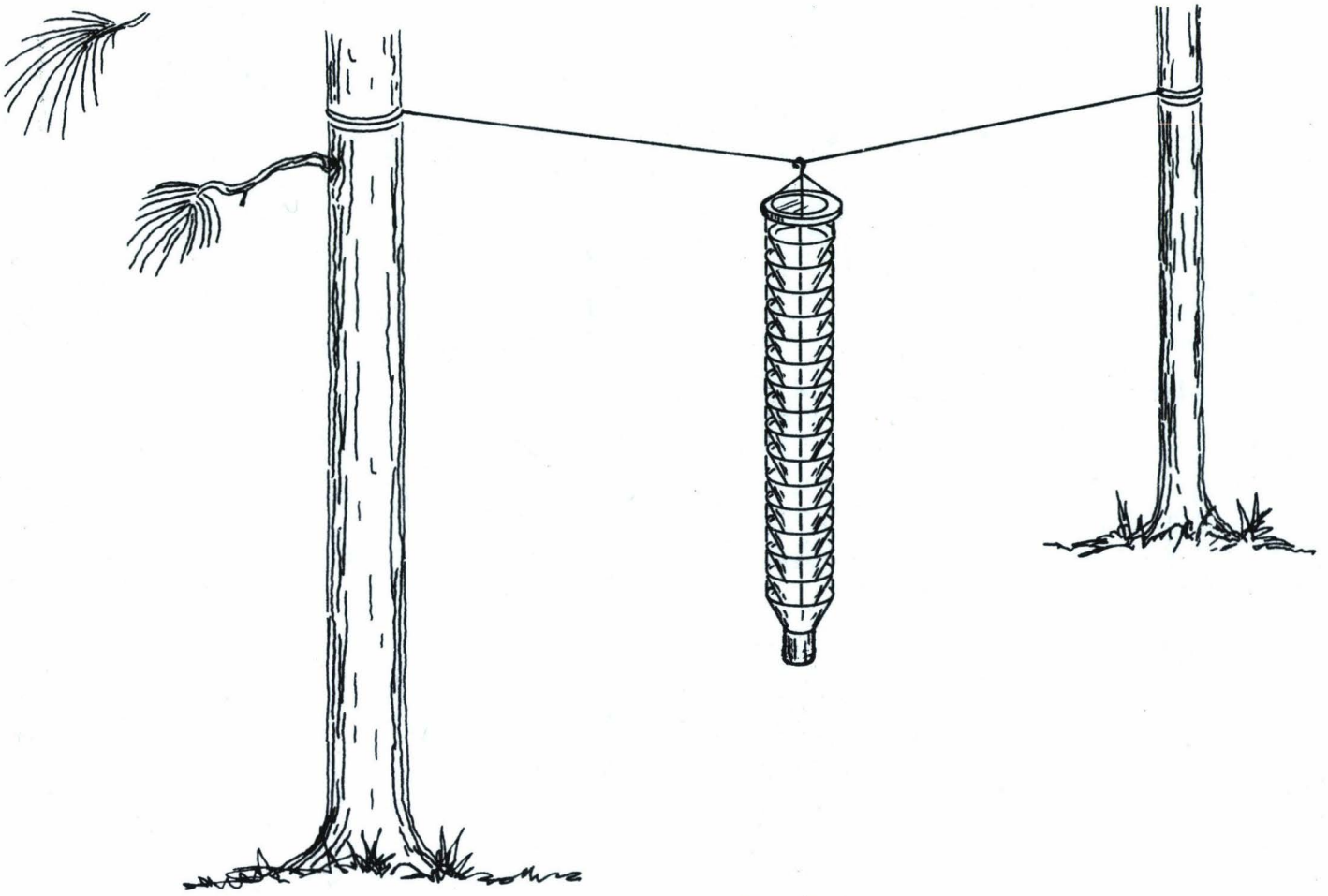
Northern Region

FOREST PEST
MANAGEMENT

BARK BEETLE CONDITIONS NORTHERN REGION 1991



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EXPERIMENT STATION

BARK BEETLE CONDITIONS
NORTHERN REGION
1991

INTRODUCTION

Continuing a pattern established in 1988, we present a general report discussing the impacts several species of bark beetles are having on host stands throughout the Northern Region. Most data included is from the annual aerial survey. Ground surveys are conducted each fall in representative infested areas until weather conditions restrict efficient sampling. Therefore, not all areas can be surveyed. As a result, some local infestations may reflect conditions different from those we report. However, we try to distribute ground surveys throughout infestations in most reporting areas. This enables us to reasonably predict declines or increases in beetle population and damage trends.

MOUNTAIN PINE BEETLE

The decline in mountain pine beetle (MPB)-caused mortality that began in 1982, continued in 1991. Total infested acres--all host species on all ownerships--were slightly more than 163,000; down from just under 200,000 acres in 1990 (Appendix, Figure 15; Tables 1 and 2).

In northern Idaho, 2,211 acres of infested lodgepole pine stands were recorded during aerial surveys. We believe this increase--from 572 acres in 1990--is more an indication of aerial surveying technique than increasing MPB damage. In Montana, infested lodgepole pine stands totaled slightly less than 146,000 acres; down from just over 186,000 acres in 1990. Major outbreaks, in some stands, still occur on the Flathead National Forest (NF), Kootenai NF, Lolo NF and Flathead Indian Reservation (IR)--all in the northwest portion of the State. The Deerlodge NF, Stillwater State Forest (SF) and Thompson River SF--areas that once contained major outbreaks--now have rapidly declining beetle populations. The difficulty in distinguishing MPB-caused mortality from secondary bark beetle damage in lodgepole pine stands, from the air, resulted in the apparent increases in damage on the Beaverhead, Deerlodge and Gallatin NFs. Ground evaluations in a large number of these stands indicated the damage was caused by pine engravers, other bark beetles and/or porcupines. With the exception of some areas on the Lolo, Kootenai, and Flathead NFs--where active MPB populations still exist--we expect the declining trend to continue in 1992.

An increase in acres of ponderosa pine killed by MPB was recorded for Idaho in 1991. Most, however, resulted from the difficulty associated with determining the responsible bark beetle from the air. In the Craig Mountains reporting area, faded pines recorded as MPB-killed in 1991, were recorded as having been killed by western pine beetle (WPB) in 1990.

Mortality in ponderosa pine stands, in Montana, declined on all ownerships. The Bitterroot NF reporting area contained the most damage--1,413 acres. The Kootenai and Lolo NFs contained active, though declining, populations. The once-active outbreak on the Crow and Northern Cheyenne IR's has declined to a combined 84 acres.

Beetle-caused mortality in whitebark pine stands, in 1991, was endemic throughout the Region.

Table 1.--Acres under Federal jurisdiction in the Northern Region on which MPB-caused mortality was aerially observed, 1990 and 1991.

	1990				1991			
Area	LPP[1]	PP	WBP	WWP	LPP	PP	WBP	WWP
Beaverhead NF	41	-	2	-	489	-	-	-
Bitterroot NF	14	1,505	-	-	91	363	-	-
Clearwater NF	-	4	-	4	20	2	2	8
Custer NF	-	44	18	-	38	-	-	-
Deerlodge NF	852	-	2	-	960	2	-	-
Flathead NF	8,157	14	109	2,124	4,785	28	118	8,349
Gallatin NF	*	*	*	*	1,408	2	101	-
Helena NF	112	34	2	-	509	44	4	-
IPNFs	78	33	2	34	304	3	-	102
Kootenai NF	132,858	1,770	105	1,392	104,117	793	4	540
Lewis & Clark NF	8	810	-	-	-	42	-	-
Lolo NF	21,590	1,014	-	43	24,537	188	6	119
Nez Perce NF	266	6	86	4	506	-	81	6
Total NF	**163,976**	**5,234**	**326**	**3,601**	**137,764**	**1,467**	**316**	**9,124**
Glacier NP	*	*	*	*	*	*	*	*
Yellowstone NP	*	*	*	*	*	*	*	*
Blackfeet IR	*	*	*	*	*	*	*	*
Crow IR	-	216	-	-	-	44	-	-
Flathead IR	1,194	334	2	-	893	145	-	2
Fort Belknap IR	*	*	*	*	*	*	*	*
N. Cheyenne IR	-	-	-	-	-	40	-	-
Nez Perce IR	-	-	-	-	2	-	-	-
Rocky Boy's IR	4	28	-	-	*	*	*	*
BLM (Total)	22	46	2	-	141	14	2	13
Total (Non-NF)	**1,220**	**624**	**4**	**-**	**1,036**	**243**	**2**	**15**
Total Federal	**165,196**	**5,858**	**330**	**3,601**	**138,800**	**1,710**	**318**	**9,139**

[1]LPP = Lodgepole pine; PP = ponderosa pine; WBP = whitebark pine; WWP = western white pine
* Not flown.

Table 2.--Acres of State and private ownership (within the following reporting areas) in the Northern Region on which MPB-caused mortality was aerially observed, 1990 and 1991.

	1990				1991			
Area	LPP[1]	PP	WBP	WWP	LPP	PP	WBP	WWP
Beaverhead NF	11	-	-	-	16	-	-	-
Bitterroot NF	-	3,092	-	-	2	1,051		
Clearwater NF	-	-	-	2	-	4	-	-
Custer NF	-	2	-	-	2	-	2	
Deerlodge NF	152	-	-	-	304	-	-	-
Flathead NF	928	60	2	129	301	106	-	114
Gallatin NF	*	*	*	*	111	-	-	-
Helena NF	78	112	-	-	38	53	-	-
IPNFs	-	2	-	-	25	-	-	2
Kootenai NF	8,981	439	-	22	3,184	146	-	12
Lewis & Clark NF	23	78	-	-	-	51	-	-
Lolo NF	2,561	1,185	-	-	3,089	278	-	-
Nez Perce NF	4	-	-	-	749	-	6	-
Pend Oreille SF	-	4	-	-	17	31	-	-
Stillwater SF	4,415	-	-	172	461	30	-	988
Swan River SF	8	2	-	50	22	-	-	204
Thompson River SF	1,004	115	-	-	366	38	-	-
Garnets	10	723	-	-	24	233	-	-
Cataldo FPD	35	-	-	-	30	-	-	2
CLW/Potlatch FPD	17	113	-	-	-	-	-	-
Craig Mtn. FPD	16	-	-	-	376	660	2	-
Kendrick FPD	-	-	-	-	2	2	-	-
Maggie Cr. FPD	154	-	-	-	-	4	-	-
Mica FPD	-	-	-	-	10	144	-	-
W. St. Joe FPD	-	-	-	-	8	2	-	-
Total	**18,397**	**5,927**	**2**	**375**	**9,137**	**2,833**	**10**	**1,322**

[1]LPP = Lodgepole pine; PP = ponderosa pine; WBP = whitebark pine; WWP = western white pine

Large increases in acres of MPB-caused mortality have occurred in 1990 and 1991 in western white pine stands in Montana on the Flathead NF--especially along Hungry Horse Reservoir (Hungry Horse RD)--and on the Stillwater and Swan River SF's. This population increase contradicted what we believed to be the case in 1990. At that time, stands were not evaluated on the ground. Some trees were inspected during summer 1989 along Hungry Horse Reservoir, but no current-MPB activty was noted. We believe three occurrences have led to this active outbreak: blister rust is very prevalent; trees were drought stressed; and trees were further damaged by extremely cold weather in February 1989.

Scattered, and mostly light, mortality occurred in western white pine stands across the remainder of the Region. An exception was a few seriously affected stands on the Glacier View RD, Flathead NF.

Beaverhead National Forest

Aerial surveys recorded 533 acres of infested lodgepole pine--mostly on the Madison Ranger District (RD) (Tables 1 and 2). Ground surveys and observations found pine engravers and other secondary bark beetles to be the cause of most of that mortality. MPB was no doubt endemic in other areas.

Bitterroot National Forest

Mountain pine beetle damage to ponderosa pine stands continued to decline on all ownerships within the reporting area (Tables 1 and 2; Appendix Figure 1). Ground evaluations from French Basin and Grouse Butte, near Darby, found no successful 1991 beetle attacks. The apparent increase in lodgepole pine mortality in the Dennis Mountain area, West Fork RD, resulted from that area being aerially surveyed in 1991 and not surveyed in 1990.

Deerlodge National Forest

An increase in infested lodgepole pine acres was recorded during aerial surveys in 1991 (Appendix, Figure 2; Tables 1 and 2). A large number of recorded areas were visited on the ground and found to have active populations of pine engravers and damage from porcupine girdling. No new successful MPB attacks were observed around the Delmoe Lake area, which has had active beetle populations in the recent past. Although some locally active MPB populations may exist in areas we didn't ground survey, the beetle now appears to be at endemic levels throughout the reporting area.

Flathead National Forest

A large drop in acres of MPB-infested lodgepole pine--from 9,085 in 1990 to 5,086 in 1991--was offset by a large buildup in MPB-infested western white pine stands. In the latter type, acreage increased from 2,253 in 1990 to 8,475 in 1991 (Table 3). In spite of decreased acreage of lodgepole pine mortality, numbers of successfully attacked trees recorded on ground surveys increased to 38 per acre in 1991 from 17 per acre in 1990. While MPB activity continued to decline on the northern portion of the Forest, populations are still active, and in some locales on the southern portion of the Forest, are increasing (Appendix, Figure 3).

A dramatic increase in MPB activity in western white pine stands resulted in 25 trees per acre being killed in 1991. That contrasted to an average 4 trees per acre killed in 1990 (Table 3). Almost the entire length of Hungry Horse Reservoir on both east and west side has large numbers of faded white pine (Appendix, Figure 3).

Mortality from MPB in ponderosa pine and whitebark pine stands was light and scattered across the reporting area.

Table 3.--Acres of host infested and pine species per acre killed by MPB
Flathead reporting area, 1990 and 1991.

	- - - Acres infested - - -			- - - Average no. trees/acre killed - - -			
Ownership	Host	1990	1991	Older	1990	1991	To date
Glacier View RD	LPP	2,367	1,010	8.0	11.3	0	19.3
	PP	2	0	-	-	-	-
	WBP	83	98	-	-	-	-
	WWP	687	1,885	1.0	3.0	4.0	8.0
Hungry Horse RD	LPP	1,476	1,201	35.2	17.5	70.5	123.2
	WBP	6	18	-	-	-	-
	WWP	1,049	5,921	10.3	5.7	22.3	38.3
Spotted Bear RD	LPP	79	404	9.9	11.2	24.8	45.9
	PP	0	8	-	-	-	-
	WBP	20	2	-	-	-	-
	WWP	77	263	0.8	1.4	35.7	37.9
Swan Lake RD	LPP	1,297	1,794	12.8	33.9	68.1	114.8
	PP	12	18	-	-	-	-
	WWP	311	278	-	-	-	-
Tally Lake RD	LPP	2,938	376	-	-	-	-
	PP	0	2	-	-	-	-
	WWP	0	2	-	-	-	-
State, private, other	LPP	928	301	-	-	-	-
	PP	60	106	-	-	-	-
	WBP	2	0	-	-	-	-
	WWP	129	125	-	-	-	-
Total/weighted avg.	**LPP**	**9,085**	**5,086**	**14.0**	**18.6**	**38.4**	**71.0**
	WWP	**2,253**	**8,475**	**6.1**	**4.0**	**24.8**	**34.9**

Gallatin National Forest

Of 1,408 acres of MPB-infested lodgepole pine on Forest lands, 1,295 acres occurred in stands in unroaded areas on the Big Timber RD. Because the Forest was not aerially surveyed in 1990, we could not determine if that was an increasing trend. Other pine species across the reporting area had scattered attacks (Appendix, Figure 4; Tables 1 and 2).

Helena National Forest

MPB populations in pine stands increased slightly on Federal lands and decreased on surrounding lands in 1991 (Tables 1 and 2). District personnel have reported lodgepole pine stands, winter damaged in February 1989 on the Townsend RD, are now harboring populations of MPB. Aerial observations have confirmed the presence of faded trees. Unfortunately, this was one of the areas we were not able to ground survey in 1991. We will monitor that outbreak during spring 1992.

Idaho Panhandle National Forests

Acres of fading lodgepole pine increased on the Bonners Ferry and Fernan RD's and decreased across the remainder of the Forests (Tables 1 and 2). Several lodgepole pine stands in the Boulder Creek and Moyie River areas, Bonners Ferry RD, were visited. Data from stands in those areas were analyzed using a loss prediction model to estimate losses should beetle outbreaks develop. Many of those stands were determined as having unacceptably high risk to MPB depredations. Not coincidently, these two areas have the most active MPB populations on the IPNFs at the present time. In the Boulder Creek drainage, however, the MPB outbreak existing since 1985, has declined to a nearly static level. Aerial observations of lodgepole pine faders--in the form of small beetle-killed groups--were significantly higher in the Moyie River drainage in 1991. We will conduct thorough ground evaluations in 1992 to better determine the status of MPB in that area.

Light MPB-caused mortality occurred in other species of pines scattered throughout the reporting area (Tables 1 and 2).

Kootenai National Forest

Though still containing the most acres of MPB-infested pines, the Kootenai NF reporting area recorded declines in all species and on all ownerships in 1991 (Appendix, Figure 5; Tables 1 and 2).

Lodgepole pine stands on the Rexford RD and Three Rivers RD--upper Yaak River drainage--have the largest amount of aerially recorded mortality on the Forest. Ground evaluations in these areas indicated a substantial reduction in successful 1991 attacked trees from 1990 (Table 4). Large numbers of dead MPB were found under the bark of trees infested in 1990--indicating abnormally high amounts of overwintering mortality. Damage to lodgepole pine stands will probably continue to decline in 1992 across the Forest; however, in stands of susceptible hosts, beetle populations will quickly rebound from this temporary setback.

Mountain pine beetle populations in ponderosa pine stands have now dropped to near endemic levels throughout the reporting area (Table 4).

Table 4.--Acres infested and trees per acre killed by MPB, Kootenai reporting area, 1990 and 1991.

	- - - Acres infested - - -			- - - Average no. trees/acre killed - - -			
Ownership	Host	1990	1991	Older	1990	1991	To date
Cabinet RD	LPP	731	210	-	-	-	-
	PP	2	16	-	-	-	-
	WWP	30	49	-	-	-	-
Fisher River RD	LPP	1,257	268	-	-	-	-
	PP	572	62	-	-	-	-
	WWP	14	0	-	-	-	-
Fortine RD	LPP	13,169	1,379	-	-	-	-
	PP	242	10	-	-	-	-
	WBP	78	39	-	-	-	-
	WWP	43	30	-	-	-	-
Libby RD	LPP	12,341	12,077	-	-	-	-
	PP	735	469	-	-	-	-
	WBP	27	0	-	-	-	-
	WWP	584	32	-	-	-	-
Rexford RD	LPP	86,502	70,851	74.2	58.1	5.9	138.2
	PP	215	224	-	-	-	-
	WWP	195	202	-	-	-	-
Three Rivers RD (Troy)	LPP	4,822	4,827	-	-	-	-
	PP	4	6	-	-	-	-
	WBP	0	4	-	-	-	-
	WWF	356	154	-	-	-	-
Three Rivers RD (Yaak)	LPP	14,036	14,505	18.0	31.7	18.9	68.6
	PP	0	6	-	-	-	-
	WWP	170	73	-	-	-	-
State, private, other	LPP	8,981	3,184	-	-	-	-
	PP	439	146	-	-	-	-
	WWP	22	12	-	-	-	-
Total/weighted avg.	**LPP**	**141,839**	**107,301**	**56.6**	**49.9**	**10.0**	**116.5**
	PP	**2,209**	**939**	**-**	**-**	**-**	**-**
Species total		**145,567**	**108,835**	**-**	**-**	**-**	**-**

Lolo National Forest

The Lolo NF--alone among the major MPB outbreak areas--recorded an increase in MPB activity in lodgepole pine stands in 1991 (Appendix, Figure 6; Tables 1 and 2). Two areas on the Plains/Thompson Falls RD--Little Thompson River drainage and a roadless area near Big Hole Peak--registered large increases in acres and trees attacked in 1990. That mortality was subsequently recorded during 1991 aerial surveys. Ground survey data from Little Thompson River show a continuing increase in successful attacks in 1991. Meanwhile, the once active outbreak on Ninemile RD continued to decrease (Table 5).

The large decrease in infested acres recorded on the Superior RD was due primarily to only a portion of the District (bounded by the Clark Fork River and Ninemile Divide) being aerially surveyed in 1991. There likely was not a dramatic decline in MPB activity. The only area on the District ground surveyed, within the Tamarack Creek drainage, contained an increasing MPB population.

Mountain pine beetle damage to ponderosa pine stands continued to decline significantly across the reporting area (Table 5).

Some increase in observed MPB mortality occurred in western white pine stands on the Thompson Falls RD (Table 5).

Table 5.--Acres infested and trees per acre killed by MPB, Lolo reporting area, 1990 and 1991.

	- - - Acres infested - - -			- - - Average no. trees/acre killed - - -			
Ownership	Host	1990	1991	Older	1990	1991	To date
Missoula RD	LPP	16	104	-	-	-	-
	PP	6	12	-	-	-	-
Ninemile RD	LPP	901	636	24.6	18.4	7.8	50.8
	PP	589	16	55.0	17.6	13.9	86.5
Plains RD	LPP	16,096	17,249	2.6	20.1	71.3	94.0
	PP	225	79	-	-	-	-
Seeley Lake RD	LPP	2	33	-	-	-	-
	PP	2	29	-	-	-	-
	WBP	0	2	-	-	-	-
Superior RD	LPP	1,096	85	31.0	24.6	63.9	119.5
	PP	174	38	-	-	-	-
	WWP	41	0	-	-	-	-
Thompson Falls RD	LPP	3,479	6,430	-	-	-	-
	PP	18	14	-	-	-	-
	WBP	0	4	-	-	-	-
	WWP	2	119	-	-	-	-
Garnet Mountains	LPP	12	28	-	-	-	-
	PP	731	237	11.8	46.4	7.3	65.5
State, private, other	LPP	2,561	3,089	22.1	25.8	0	47.9
	PP	1,187	278	-	-	-	-
Total/weighted avg.	**LPP**	**24,163**	**27,654**	**10.6**	**20.3**	**51.7**	**82.6**
	PP	**2,932**	**703**	**22.7**	**39.2**	**8.9**	**70.8**
Species total		**27,138**	**28,482**				

Nez Perce National Forest

In 1991, aerial surveys recorded a significant increase in lodgepole pine stand damage caused by MPB on State and private lands north of Elk City and a slight increase on the Red River RD. Other pine species showed endemic damage levels (Appendix, Figure 7; Tables 1 and 2). We did not ground survey stands on either District.

Montana Indian Reservations

Of the several Reservations in the State, only the Flathead IR contained active MPB populations in 1991 (Appendix, Figure 9; Table 1). Beetle activity in lodgepole pines occurred along the divide with the Lolo NF between Hot Springs and Rainbow Lake in the southwestern corner of the Reservation. Ground evaluations indicated a static to slightly increasing beetle trend in that area (Table 6). The same condition should prevail in 1992.

The once-active infestations in ponderosa pine stands on the Crow and Northern Cheyenne IRs are now at endemic levels.

Table 6.--Acres infested and trees per acre killed by MPB, Flathead Indian Reservation, 1990 and 1991.

	- - - Acres infested - - -		- - - - Average no. trees/acre killed - - - - -			
Host	1990	1991	Older	1990	1991	To date
LPP	1,191	893	14.6	33.5	41.1	89.2
PP	334	145	-	-	-	-
WBP	2	0	-	-	-	-
WWP	0	2	-	-	-	-
Total	**1,530**	**1,040**	**14.6**	**33.5**	**41.1**	**89.2**

Stillwater, Swan River, and Thompson River State Forests (Montana)

Mountain pine beetle-caused mortality in lodgepole pine continued to decrease in the previously active outbreaks on the Stillwater and Thompson River SFs. Infestations in ponderosa pine stands remained essentially endemic (Table 2).

Swift Creek, between Upper Whitefish Lake and Whitefish Lake, Stillwater SF, recorded a large increase in beetle-caused mortality in stands of western white pine. Damage in white pine stands also increased on the Swan River SF, though at lesser levels (Table 2).

Fire Protection Districts and Pend Oreille State Forest (Idaho)

Increases in MPB-caused mortality in lodgepole and ponderosa pines were aerially observed on the Craig Mountain FPD in 1991. Contributing to the "apparent" increase in ponderosa pine damage in 1991 was the correct coding of faded trees by the aerial observer. In 1990, faders had been erroneously classified as killed by WPB. In 1991, MPB was correctly identified as the responsible beetle. Ground evaluations by FPM personnel in April 1991 found most of the damage was caused by MPB, not WPB. Ground surveys conducted during fall 1991 by Idaho Department of Lands (IDL) staff determined that outbreak is continuing. Ponderosa pine stands from Cottonwood to Winchester were found to have a large build-up in 1991 attacks over 1990. This condition was also prevalent in lodgepole pine stands along Webb Creek (Table 2).

Other FPDs and Pend Oreille SF had small amounts of MPB-caused damage recorded in 1991 (Table 2).

DOUGLAS-FIR BEETLE

Douglas-fir mortality attributed to Douglas-fir beetle (DFB) continued to decline as more-normal weather conditions, and salvage logging of infested trees, reduced susceptibility of remaining green trees to beetle attacks (Appendix, Figure 13; Table 7). Data, averaged from 73 ground evaluation plots, showed 1991 successful beetle attacks down substantially from 1990 levels in most areas evaluated (Table 8).

Yellowstone National Park (NP) contained a large active outbreak in trees damaged during the 1988 fires, and in other trees weakened by a combination of fire and the prolonged drought of the late 1980's. An ongoing cooperative study, involving Intermountain Station in Ogden, Utah, and pest management personnel from Regions 1 and 4, is attempting to correlate relationships between fire damage and subsequent insect outbreaks in the Park.

On the IPNFs, two areas ground surveyed in East Fork Pritchard Creek drainage, Wallace RD, had large active DFB populations with parent-to-brood ratios of 1:2. A ratio of that magnitude usually indicates an increasing beetle trend (Appendix, Figure 11). Another area with a likely increasing DFB trend is the Powell RD, Clearwater NF (Appendix, Figure 10). Unfortunately, because of early heavy snows, we have data from just one area on the District. This area, near Papoose Creek, had a parent-to-brood ratio of 1:7.6--an indication of a very active population. Likewise, aerial survey estimates of DFB-attacked trees, and infested acres. on the Powell RD were up markedly in 1991.

Other areas in northern Idaho which recently had active DFB populations--upper St. Joe River, Avery RD, and Fernan, Priest Lake and Sandpoint RDs, IPNFs; North Fork Clearwater River, Canyon RD, Clearwater NF; and Nez Perce NF; --presently have rapidly declining or endemic infestations (Appendix, Figure 12; Table 7).

Table 7.--Aerially observed infested acres and mortality attributed to DFB in the Northern Region by reporting area, 1990 and 1991.

	1990			1991		
Reporting Area	Acres	Trees	Vol. (MBF)	Acres	Trees	Vol. (MBF)
Beaverhead NF	3,012	2,561	512.2	1,395	1,607	321.4
Bitterroot NF	2,769	2,920	876.0	3,730	4,762	1,415.9
Clearwater NF	966	5,075	1,776.3	746	2,919	1,021.6
Custer NF	4	9	1.8	2	20	4.0
Deerlodge NF	45	38	7.6	165	176	35.2
Flathead NF	194	302	90.6	770	774	232.2
Gallatin NF	*	*	*	1,183	1,210	242.0
IPNFs	3,584	15,089	5,281.2	847	2,666	933.1
Helena NF	12	18	3.6	35	114	22.8
Kootenai NF	1,240	991	297.,3	472	616	184.8
Lewis & Clark NF	2	10	2.0	-	-	-
Lolo NF	1,546	1,446	433.8	1,775	2,475	742.5
Nez Perce NF	2,043	6,539	2,288.7	1,368	3,580	1,253.0
Kootenai SF	-	-	-	1	3	1.1
Swan River SF	127	140	42.0	111	155	46.5
Thompson River SF	8	10	3.0	57	146	43.8
Flathead IR	117	225	67.5	80	153	45.9
Nez Perce IR	13	65	22.8	4	15	5.3
Garnets	49	130	39.0	236	327	98.1
Cataldo FPD	111	495	173.3	34	99	34.7
CLW/Potlatch FPD	897	4,741	1,659.4	136	481	168.4
Craig Mtn. FPD	14	105	36.8	52	210	73.5
Kendrick FPD	104	460	161.0	26	65	22.8
Maggie Cr. FPD	92	407	142.5	38	120	42.0
Mica FPD	52	159	55.7	29	105	36.8
Pend Oreille FPD	35	165	57.8	40	104	36.4
Priest Lake FPD	58	260	91.0	10	33	11.6
W. St. Joe FPD	95	480	168.0	42	125	43.8
Total	**17,189**	**42,840**	**14,290.9**	**13,384**	**23,060**	**7,119.2**

*Not flown.

In Montana, DFB-caused damage declined in most areas. Newly attacked Douglas-fir on the Bitterroot and Lolo NFs, which had the most active DFB populations in 1990, were down substantially in 1991. The Madison RD, Beaverhead NF, had some small active infestations in Bear Creek and North Fork Meadow Creek drainages. Hungry Horse and Glacier View RDs, Flathead NF, and adjoining State of Montana lands, particularly on the Swan River SF and Coal Creek SF, respectively, had some of the more active DFB outbreaks in the State. Ground surveys showed an increase in 1991 successful attacks over 1990 attacks, and parent-to-brood ratios of 1:2 (Appendix, Figures 1, 2, 3, 5, & 6; Table 8).

Table 8.--Average number of Douglas-fir attacked by DFB on selected plots (73) throughout infested reporting areas in northern Idaho and Montana, 1991.

Reporting Area	1990 Dead	1991 Successful Attack	1991 Unsuccessful Attack	Total dead per plot	Trend
Beaverhead NF	9	5	2	14	Static to decreasing
Bitterroot NF	15	2	1	17	Decreasing
Clearwater NF	30	20	1	50	Static[1]
Deerlodge NF	8	1	0	9	Decreasing[1]
Flathead NF	7	6	4	13	Static
Flathead IR	4	2	4	6	Decreasing
Gallatin NF	28	11	3	39	Static
Helena NF	4	3	0	7	Decreasing[1]
IPNFs (CDA)	28	25	10	43	Static
IPNFs (St. Joe)	18	2	2	20	Decreasing
Lolo NF	11	3	3	14	Decreasing
Nez Perce NF	15	1	2	16	Decreasing

[1] Only one plot from these reporting aras.

The preceding data (Tables 7 and 8) for the Gallatin NF do not accurately represent DFB conditions observed in 1991 (Appendix, Figure 4). Areas on Livingston RD which contain active populations--built up from blowdown in 1988--were not flown during aerial surveys in 1991. In addition, the Thompson Creek fire, which occurred during July 1991 in the upper Mill Creek drainage, provided numerous fire-weakened trees which are likely to be attacked in 1992. Some were already being attacked by August 1, 1991. The District will salvage as much of this damaged, infested and threatened material as they practicably can by late summer 1992.

WESTERN PINE BEETLE

In 1991, for the second consecutive year, ponderosa pine damage recorded as a result of WPB activity declined noticeably in Idaho north of the Salmon River. Approximately 2,000 acres and an estimated 6,400 trees were infested--compared to 9,900 acres and 46,000 trees in 1990. In 1989, more than 19,600 acres and 37,000 trees were reported killed. Ground observations by IDL found new beetle attacks occurring from Lake Coeur d'Alene south to Lewiston and east along the Clearwater River. As previously noted, beetle coding changes during aerial surveys accounted for some of the apparent reduction (Appendix, Figure 16).

In those portions of Montana where precipitation has returned to more-normal levels, damage attributed to WPB has remained at virtually endemic levels. A mere 355 beetle-killed trees on 602 acres were observed during aerial surveys in 1991.

FIR ENGRAVER

The fir engraver (FE) has followed the same trend as WPB. In Idaho, a huge buildup in reported damage during 1988 and 1989 was followed by a rapid decline in 1990 and 1991. Infested acres have declined to approximately 5,600 from 96,000 acres in 1989. Again, weather conditions seem to have been a prevailing factor. The most active remaining FE populations occur on the Craig Mountain FPD and Nez Perce NF reporting areas--though both areas are down substantially from 1990 levels (Appendix, Figure 14).

Fir engraver remained at endemic levels in Montana with 528 acres containing 655 faders reported. In 1990, 334 acres contained 653 beetle-killed trees. The adjoining Flathead IR and Lolo NF reporting areas had a combined total of 331 infested acres (Appendix, Figure 14).

PINE ENGRAVER

Damage to ponderosa pine stands in northern Idaho, attributable to pine engravers (IPS) totaled 15 acres containing 80 faded trees. Beetle populations were more active in Montana ponderosa pine stands with 3,131 dead trees recorded on 3,039 acres. The Lewis & Clark NF and Northern Cheyenne IR reporting areas each contained over 1,200 acres infested (Appendix, Figure 8). Unfortunately, Ashland RD, Custer NF, which also had active beetle populations, was not flown in 1991. We are, therefore, not sure about the extent of that infestation. Dry conditions still prevail in eastern Montana and beetle populations are still active. Wetter weather, the avoidance of fresh slash in early spring, and better treatment of any logging slash created will help return current beetle populations to endemic levels.

In Montana, a large number of lodgepole pine stands infested by IPS was observed in 1991--approximately 3,500 trees killed on 5,000 acres. Both totals are probably low because numerous areas recorded as killed by MPB during aerial surveys were found to be IPS-killed when ground checked. Many other areas were inaccessible or not evaluated. Because of the large numbers of lodgepole pine currently infested by IPS, we have begun to separate damage attributable to the beetle by pine species. Having just started that separation in 1991, we haven't yet a sufficient data base to indicate a declining or increasing population trend. However, data and observations during ground evaluations did confirm a still-active beetle condition. A very active outbreak is occurring in Yellowstone NP, and adjacent lands both privately owned and administered by Hebgen Lake RD, as a result of drought and the 1988 fires.

During 1991, two field experiments tested semiochemicals in an effort to reduce beetle-caused mortality in ponderosa pine stands on the Ashland RD, Custer NF and Northern Cheyenne IR. One was a ground application of anti-aggregation pheromones (ipsenol/verbenone) in mixed-pellet form to prevent beetles from successfully infesting green slash in thinned areas. The other, a mass-trapping program, involved

placing funnel traps baited with an attractant pheromone (ipsdienol), around green slash piles and in recently thinned areas to prevent beetles from infesting slash. Late spring snow storms, after treatments, made results obtained from the ipsenol/verbenone test inconclusive. The mass-trapping effort failed to keep beetles from infesting the slash to any appreciable extent. Both experiments will be replicated in 1992 with improved pheromones and dispensers, and we hope, better weather.

WESTERN BALSAM BARK BEETLE

Increases in subalpine fir mortality attributed to western balsam bark beetle (WBBB) were recorded in both Idaho and Montana in 1991.

A total of 208 acres and 827 beetle-killed trees were observed in Idaho. Most were recorded in the Priest Lake FPD reporting area--118 acres and 520 trees.

In Montana, approximately 7,300 acres and 14,000 trees were infested by WBBB. The Beaverhead and Gallatin NFs reporting areas had the most damage with 3,500 and 2,000 acres, respectively. Ground evaluations on the Beaverhead NF found several species of bark beetles, in addition to WBBB, likely responsible for subalpine fir mortality.

SPRUCE BEETLE

Except for an outbreak between the Salmon and Snake Rivers, Salmon River RD, Nez Perce NF, spruce beetle (SB) activity remained at endemic levels in 1991 across the Region. This outbreak of 1,139 acres and 1,469 trees is part of widespread SB mortality occurring to the south on the Payette NF (Intermountain Region) and to the west on the Hells Canyon National Recreation Area and Wallow-Whitman NF (Pacific Northwest Region). Ground evaluations in August found a large number of trees successfully attacked in 1991. The infestation to the south appeared to wane in 1991; however, we are not certain of the trend of the Nez Perce infestation.

ACKNOWLEDGEMENTS

Once again, we collectively thank those who contributed much time and effort in compiling the data on which this report is based. Without the assistance of aerial observers, ground surveyors, data managers, typists, cooperators, and many others, our attempts to disseminate information regarding bark beetle conditions in a timely manner would be futile. Our appreciation is extended to all.

APPENDIX

SCIENTIFIC NAMES

Beetles

Mountain pine beetle	*Dendroctonus ponderosae* Hopkins
Douglas-fir beetle	*Dendroctonus pseudotsugae* Hopkins
Pine engraver	*Ips pini* Say
Fir engraver	*Scolytus ventralis* LeConte
Western pine beetle	*Dendroctonus brevicomis* LeConte
Spruce beetle	*Dendroctonus rufipennis* (Kirby)
Western balsam bark beetle	*Dryocoetes confusus* Swaine

Hosts

Lodgepole pine	*Pinus contorta* var. *latifolia* Engelmann
Ponderosa pine	*Pinus ponderosa* Laws
Western white pine	*Pinus monticola* Douglas
Whitebark pine	*Pinus albicaulis* Engelmann
Limber pine	*Pinus flexilis* James
Douglas-fir	*Pseudotsuga menziesii* var. *glauca* (Beissn.) Franco
Grand fir	*Abies grandis* (Douglas) Lindl.
Subalpine fir	*Abies lasiocarpa* (Hook.) Nutt.
Engelmann spruce	*Picea engelmannii* Parry

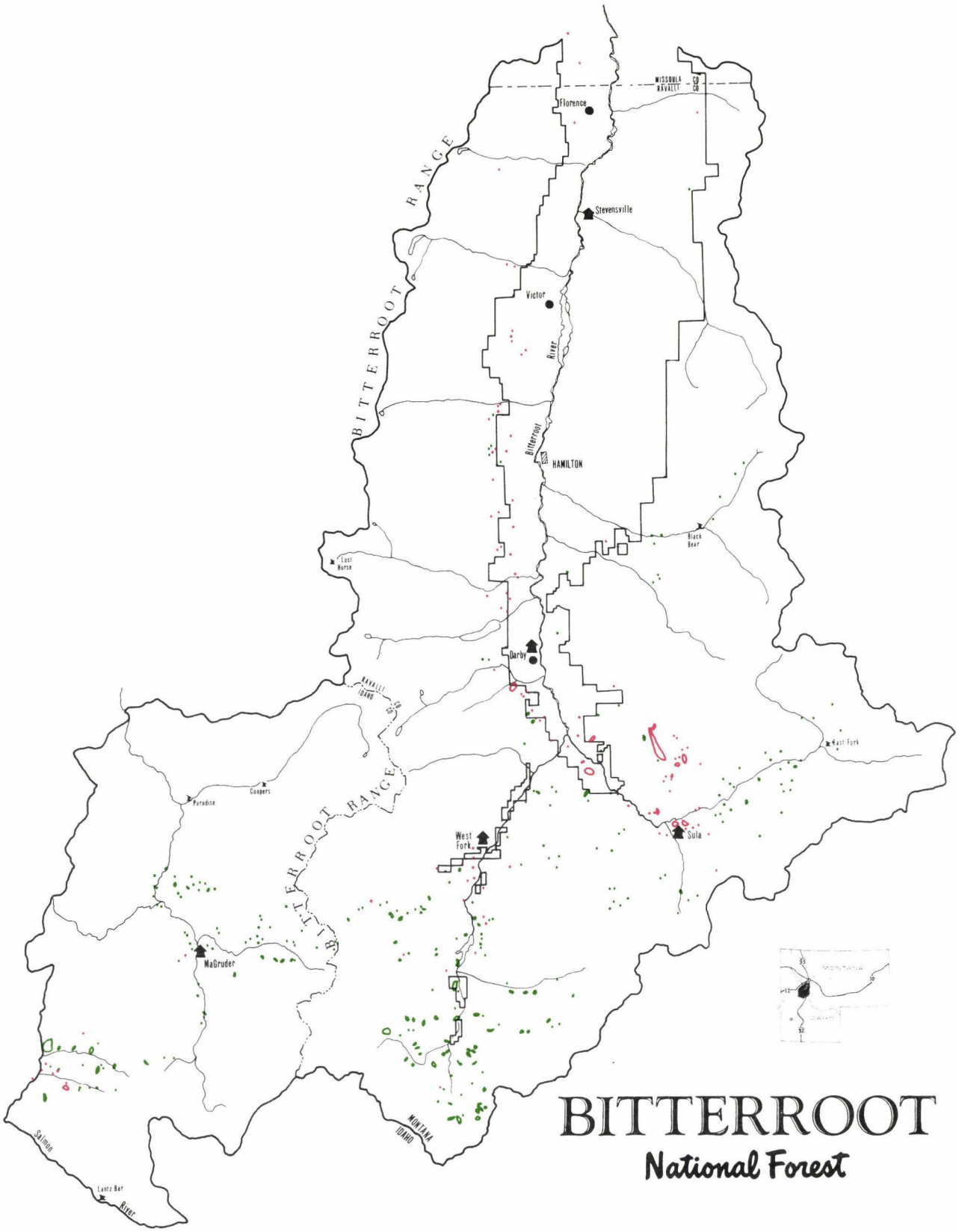

Figure 1.--Areas infested by mountain pine beetle, and Douglas-fir beetle, 1991.

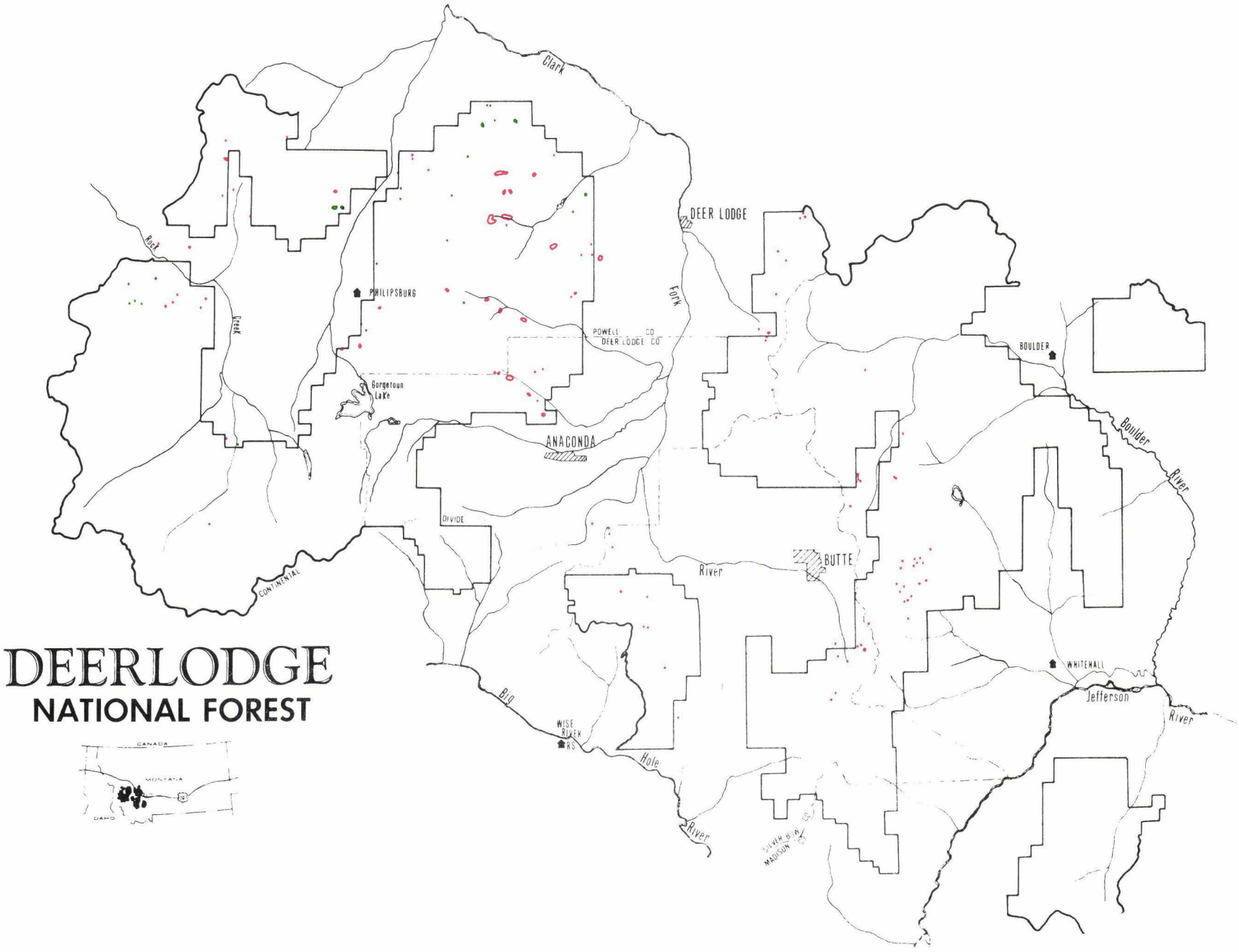

Figure 2.--Areas infested by mountain pine beetle, and Douglas-fir beetle,1991.

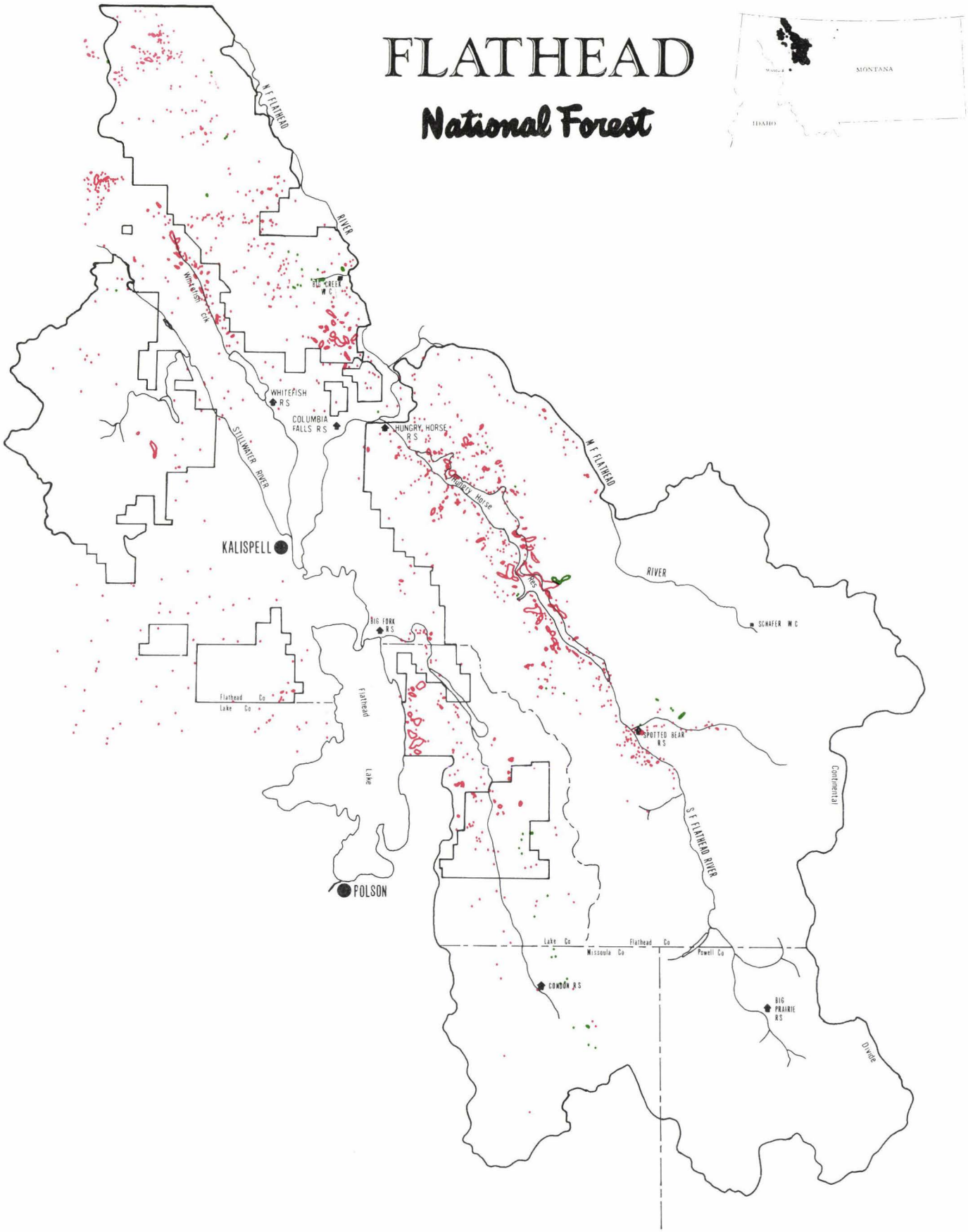

Figure 3.--Areas infested by mountain pine beetle, and Douglas-fir beetle, 1991.

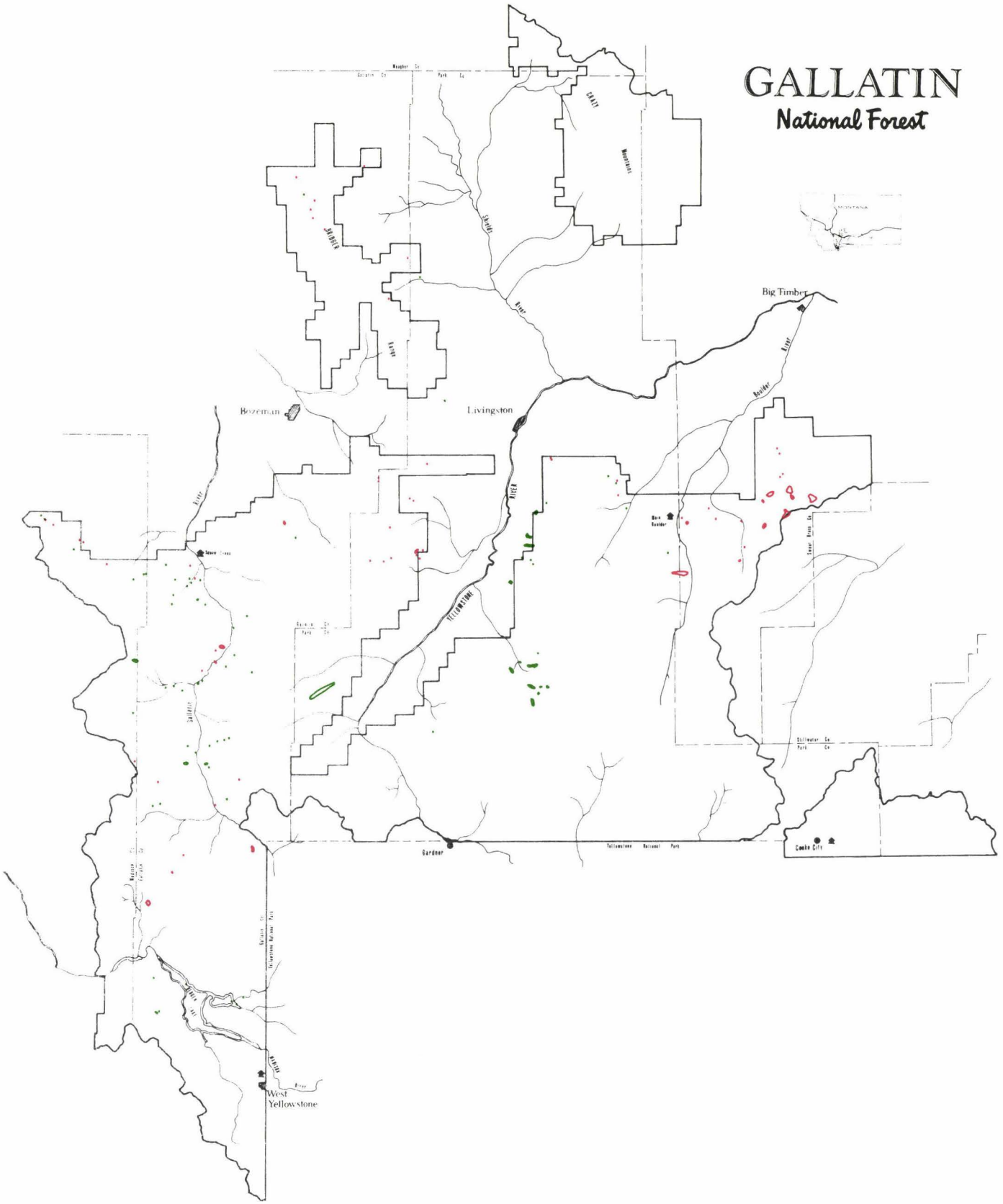

Figure 4.--Areas infested by mountain pine beetle, and Douglas-fir beetle, 1991.

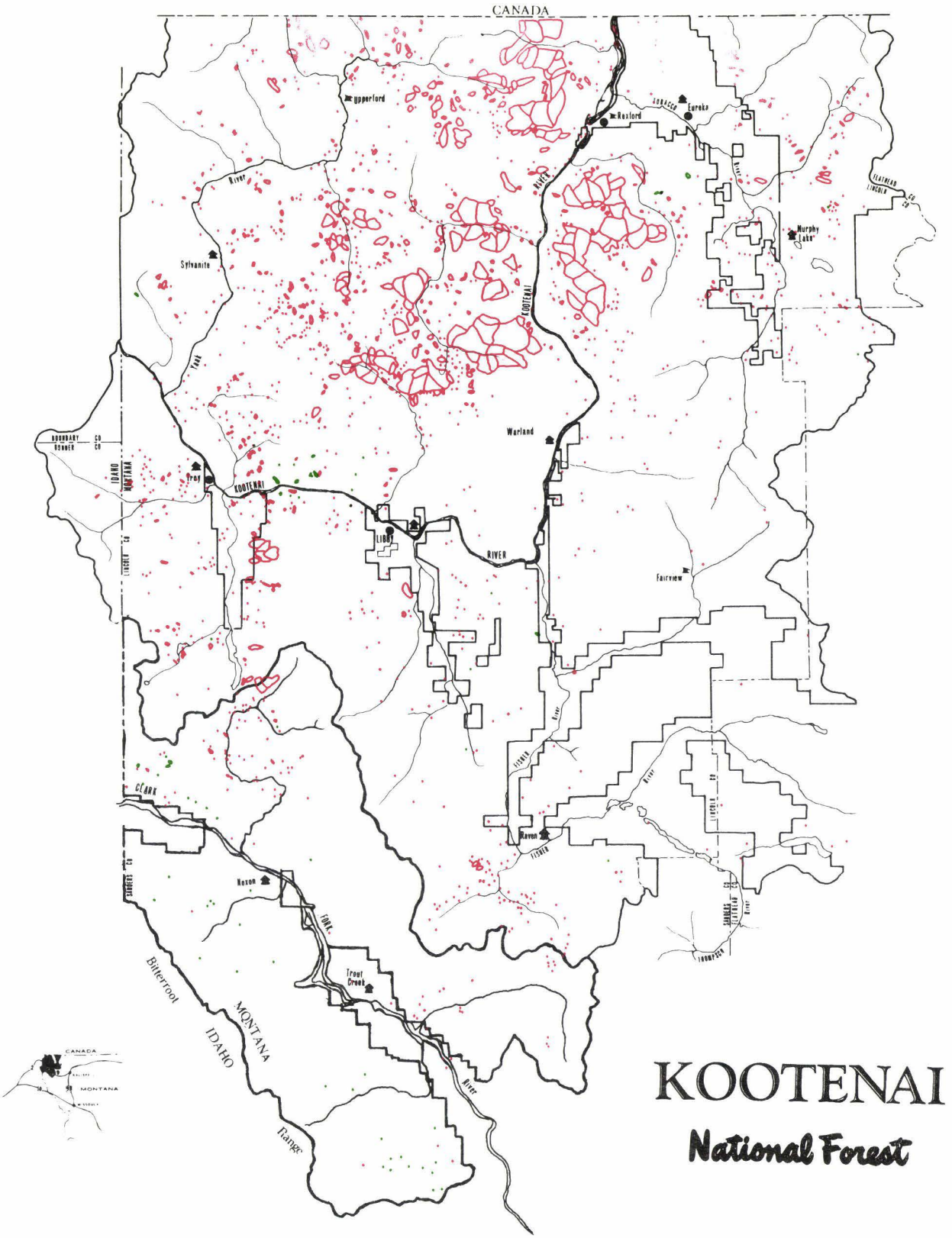

Figure 5.--Areas infested by mountain pine beetle, and Douglas-fir beetle, 1991.

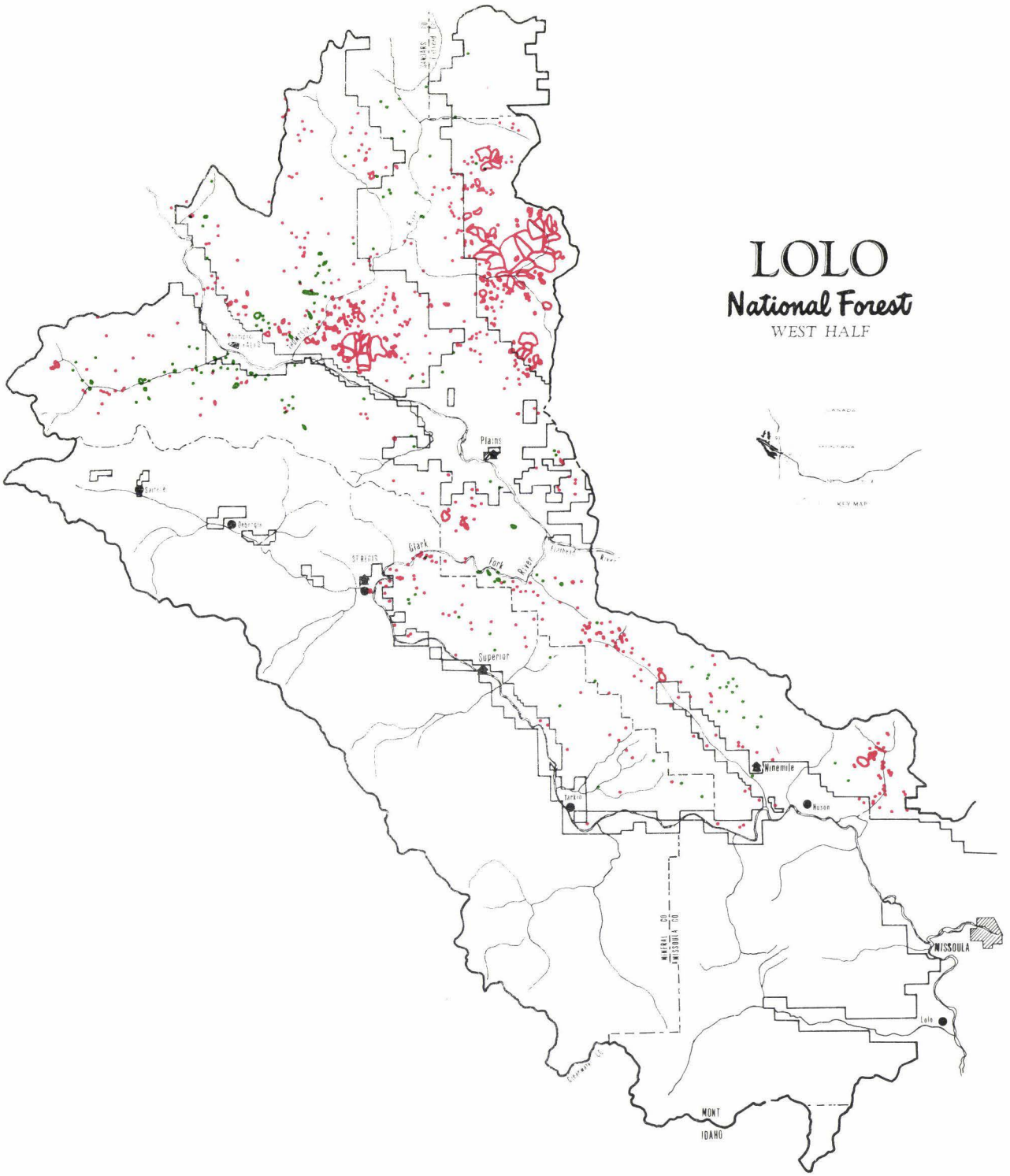

Figure 6.--Areas infested by mountain pine beetle, and Douglas-fir beetle, 1991.

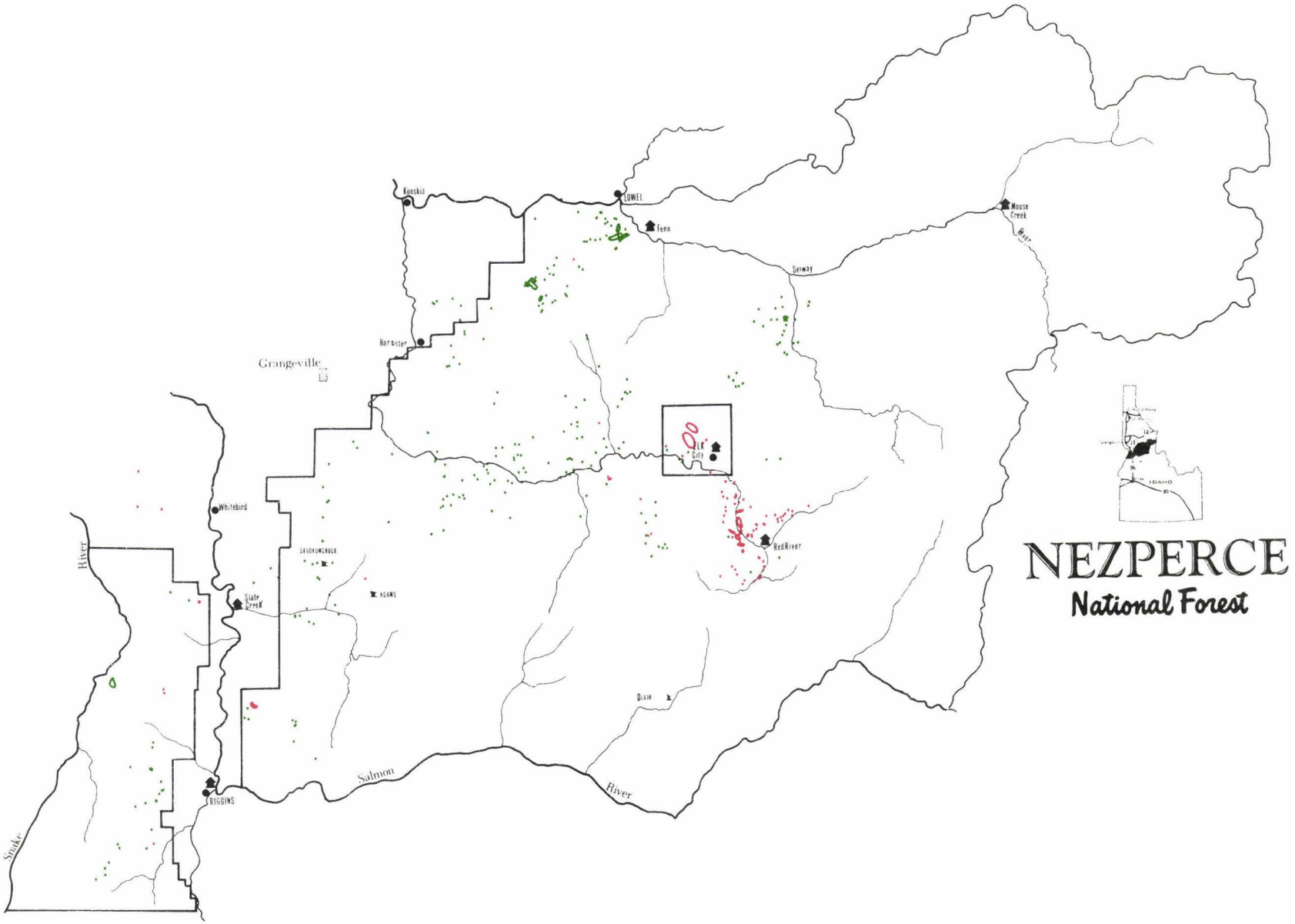

Figure 7.--Areas infested by mountain pine beetle, and Douglas-fir beetle, 1991.

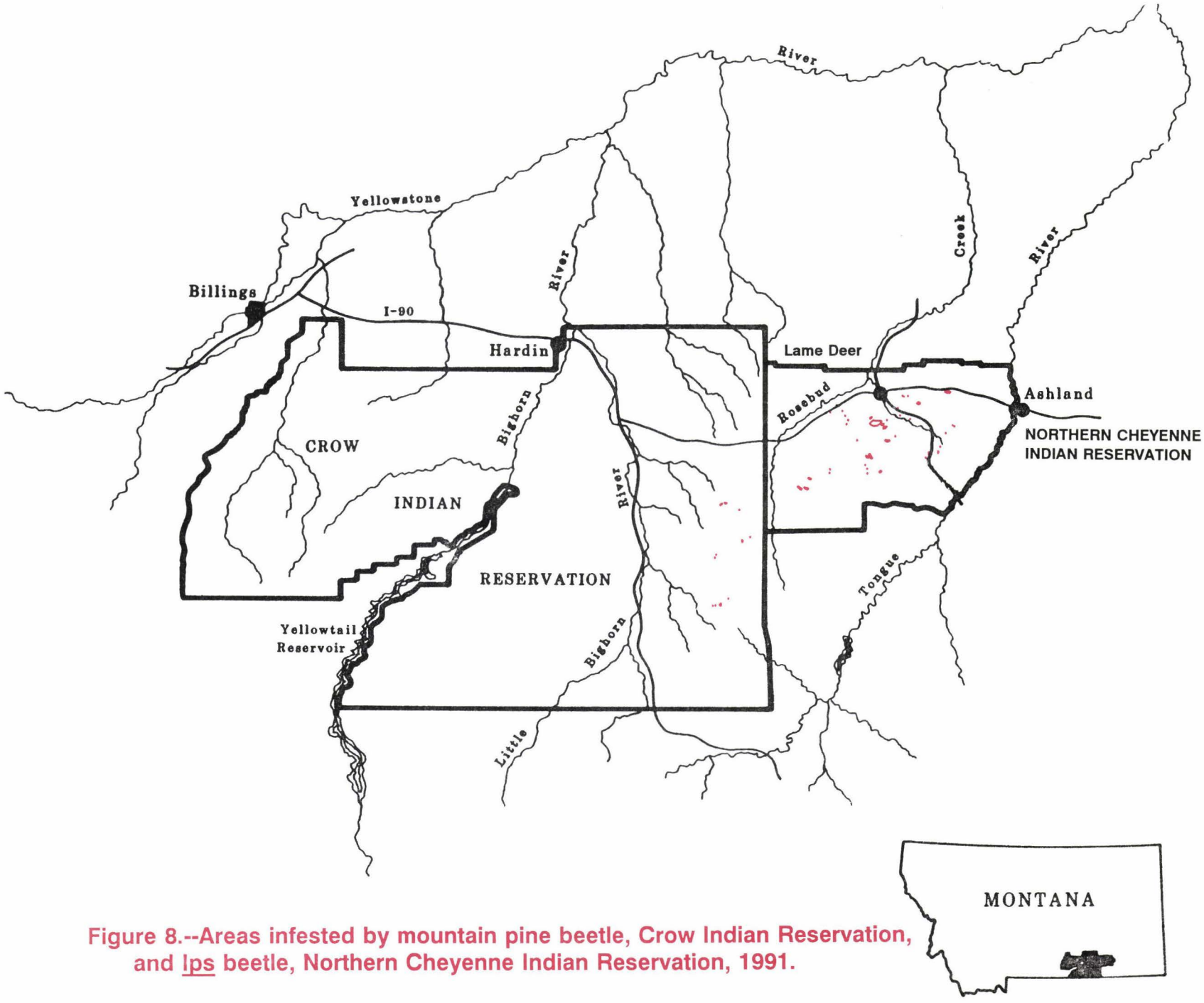

Figure 8.--Areas infested by mountain pine beetle, Crow Indian Reservation, and Ips beetle, Northern Cheyenne Indian Reservation, 1991.

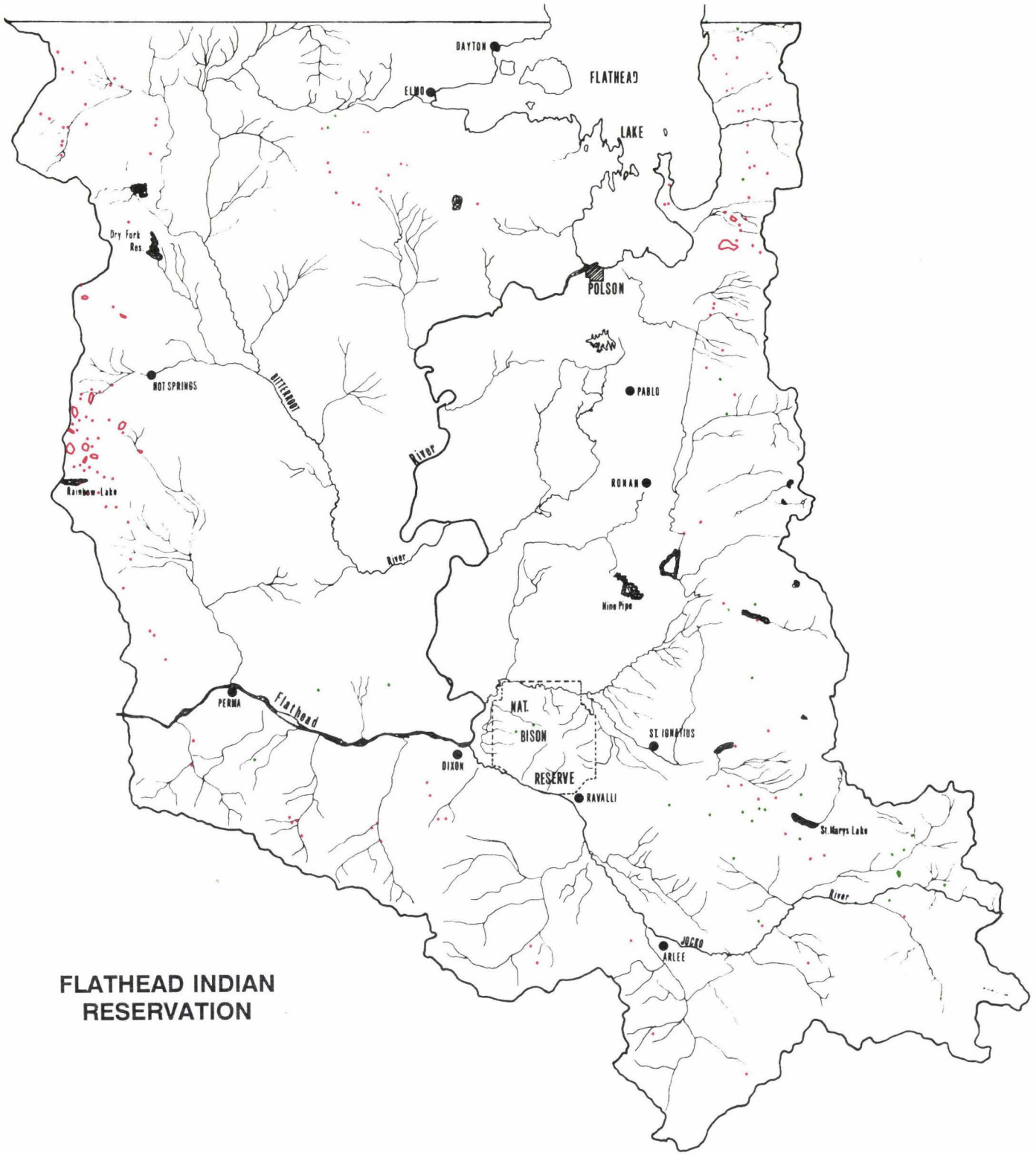

Figure 9.--Areas infested by mountain pine beetle, and Douglas-fir beetle, 1991.

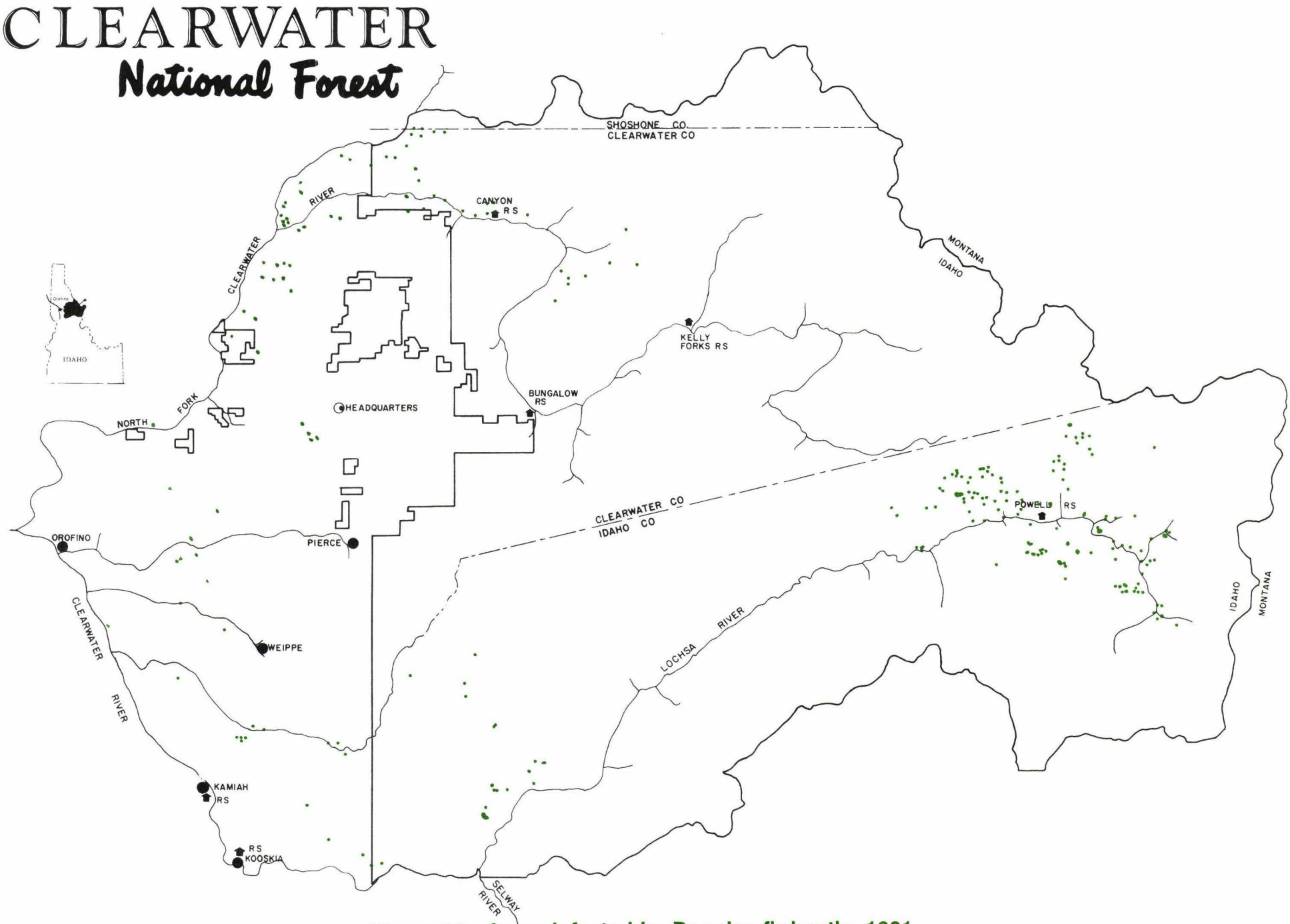

Figure 10.--Areas infested by Douglas-fir beetle, 1991.

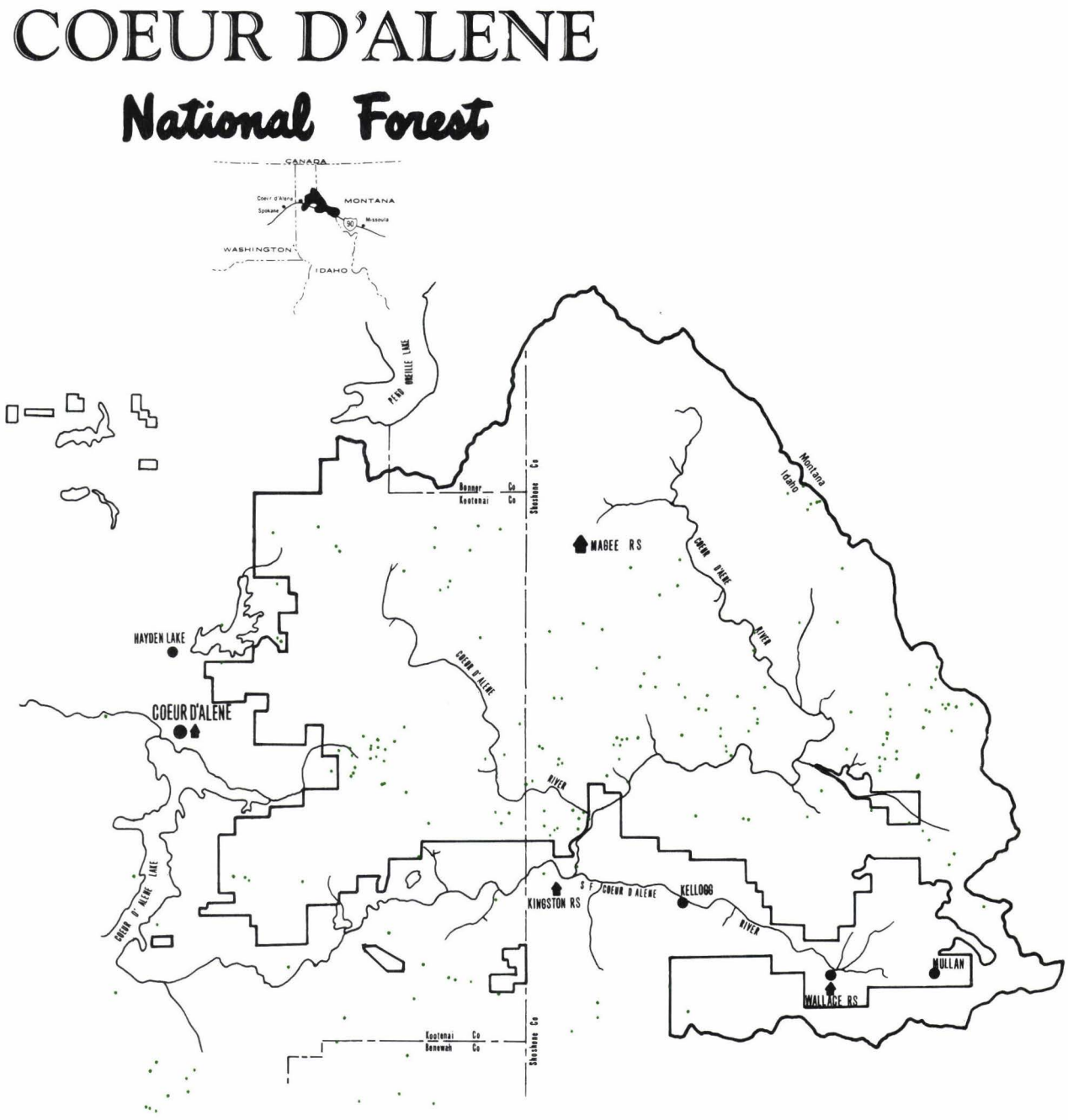

Figure 11.--Areas infested by Douglas-fir beetle, 1991.

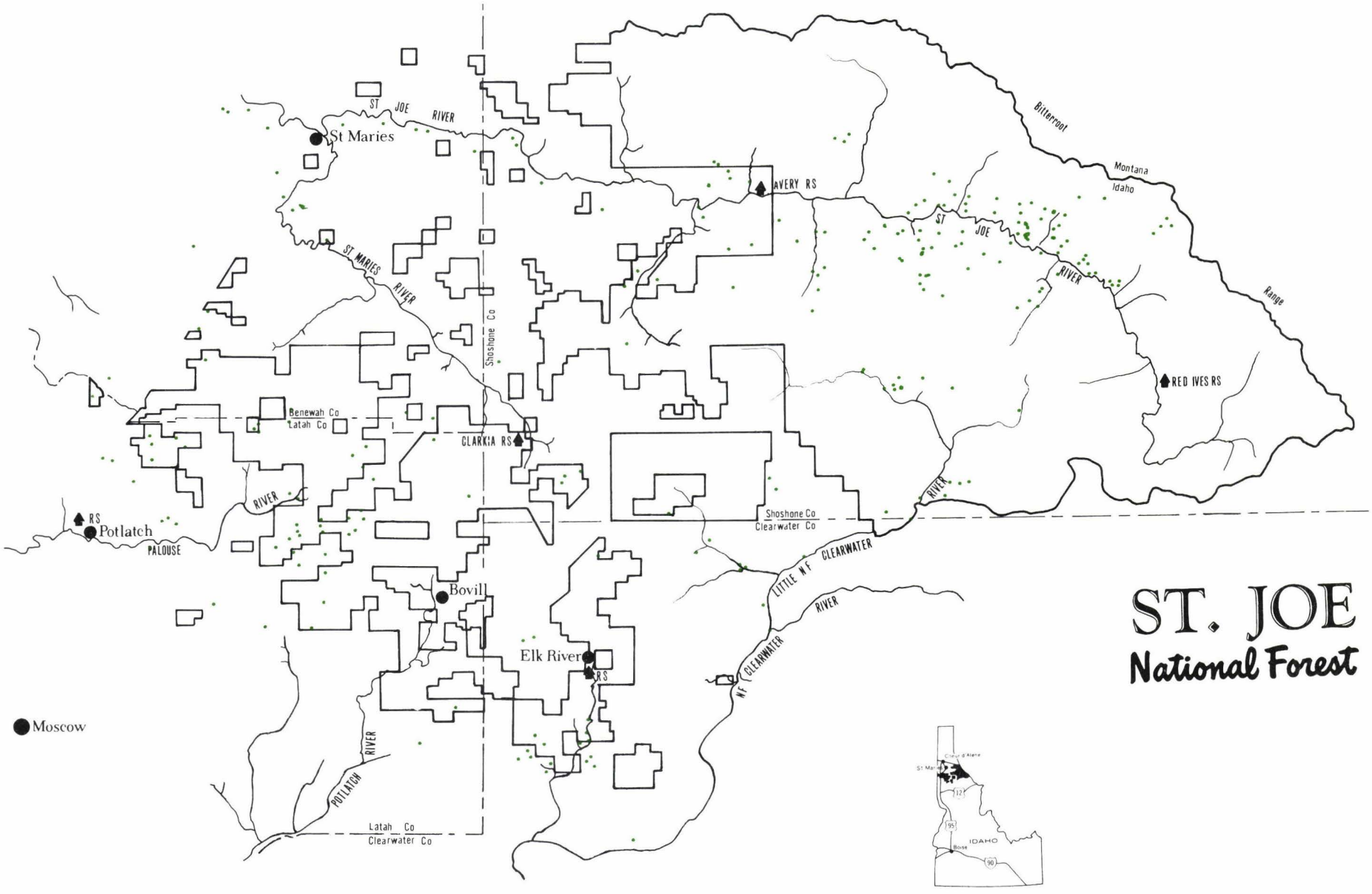

Figure 12.--Areas infested by Douglas-fir beetle, 1991.

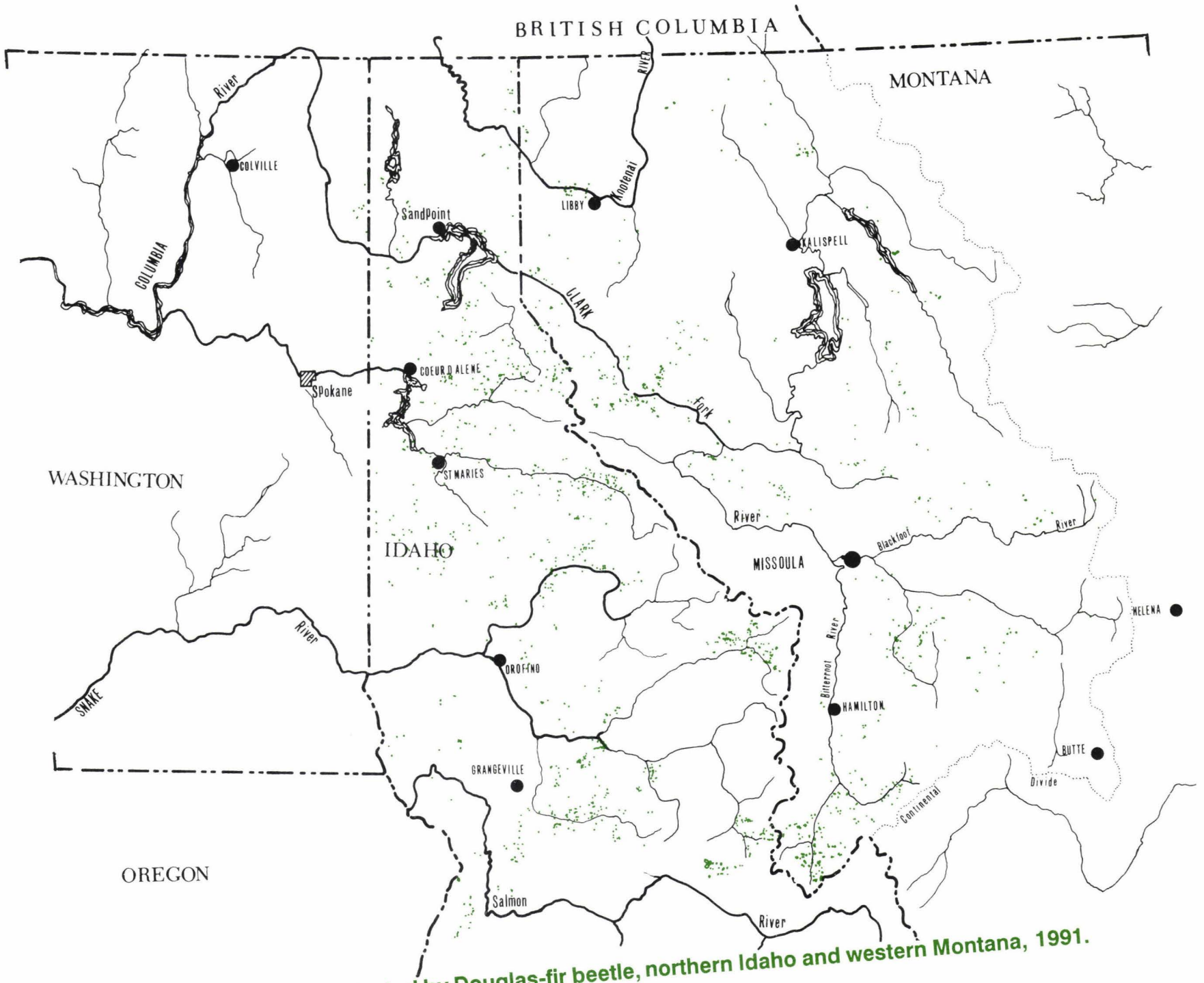

Figure 13.--Areas infested by Douglas-fir beetle, northern Idaho and western Montana, 1991.

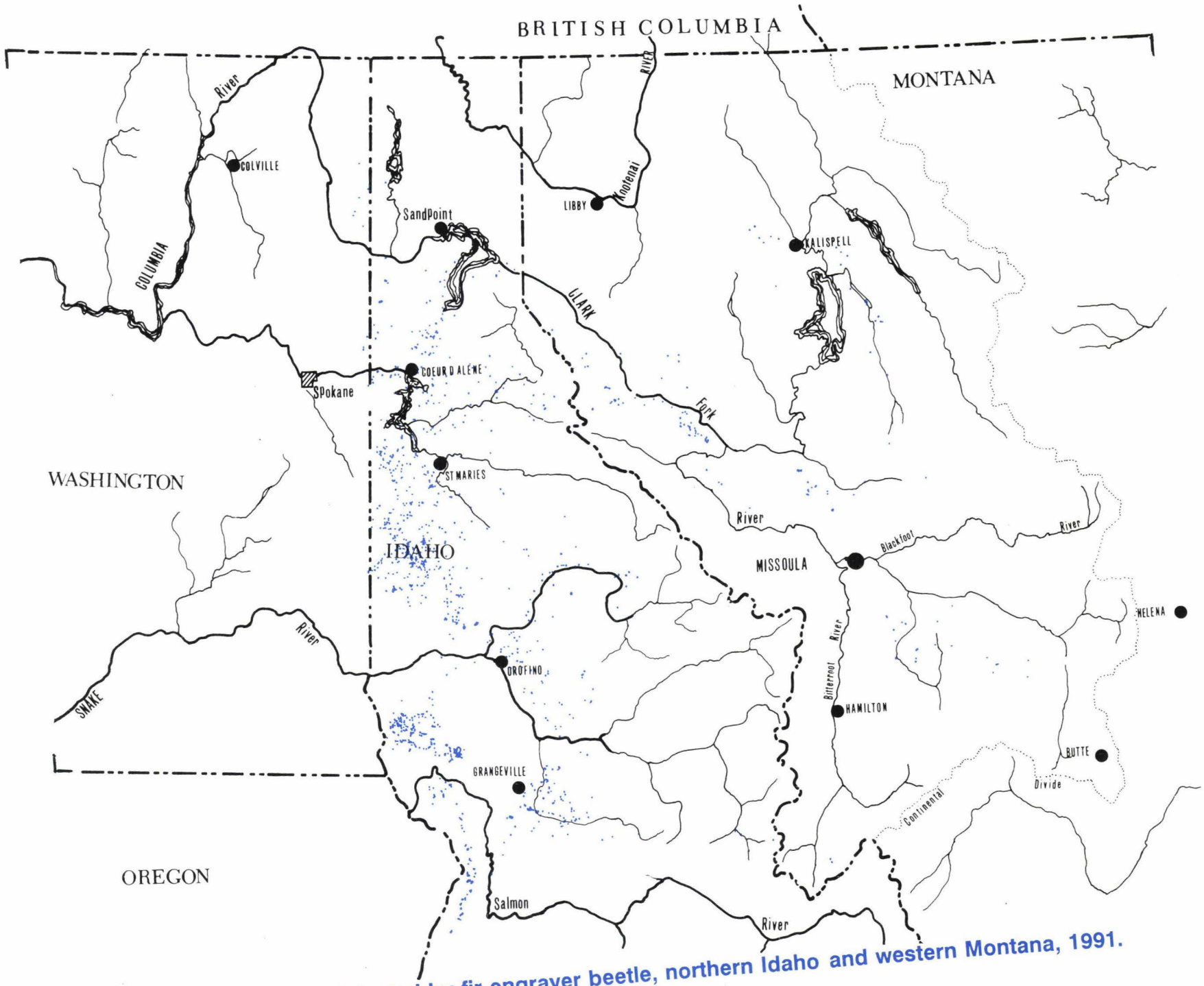

Figure 14.--Areas infested by fir engraver beetle, northern Idaho and western Montana, 1991.

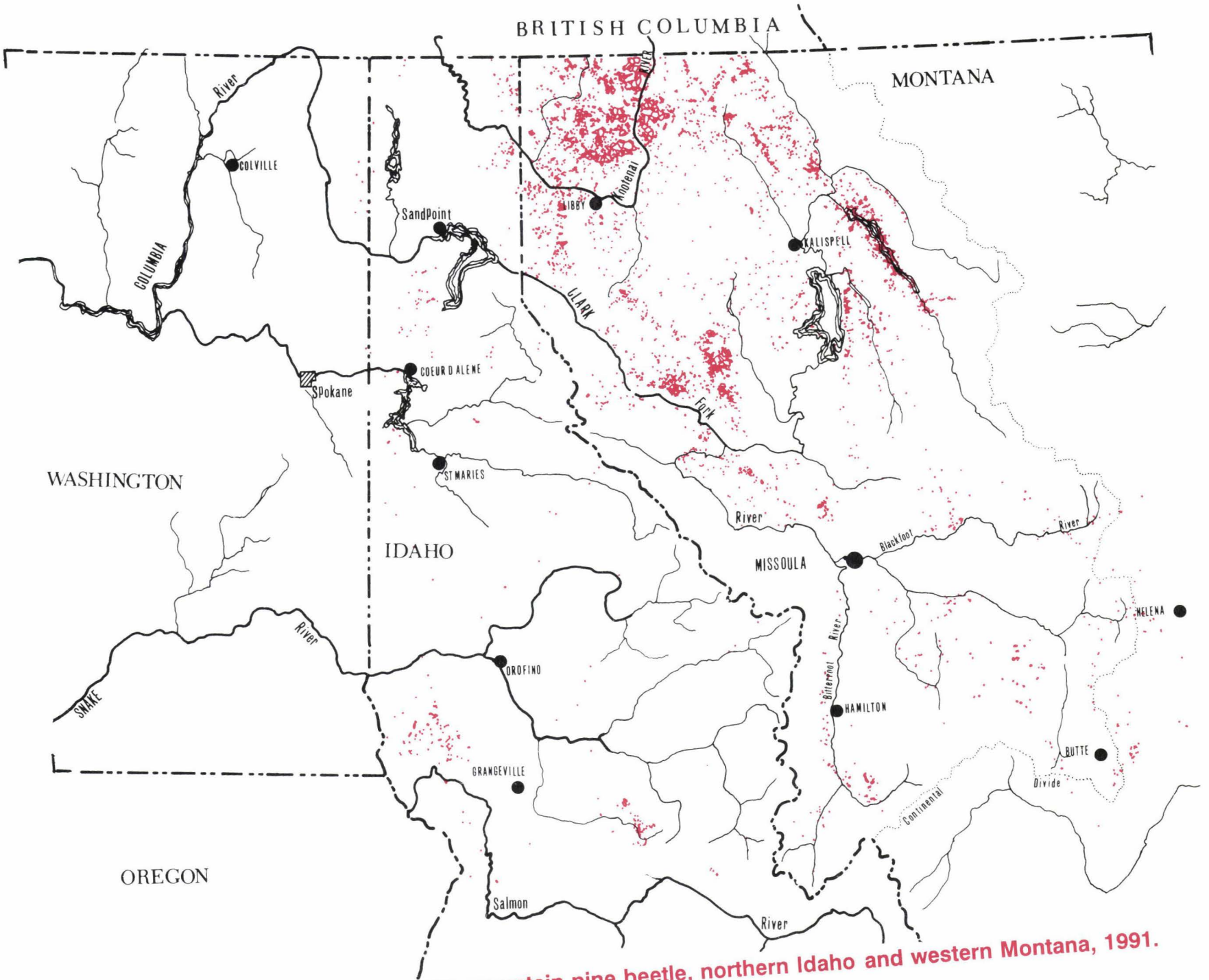

Figure 15.--Areas infested by mountain pine beetle, northern Idaho and western Montana, 1991.

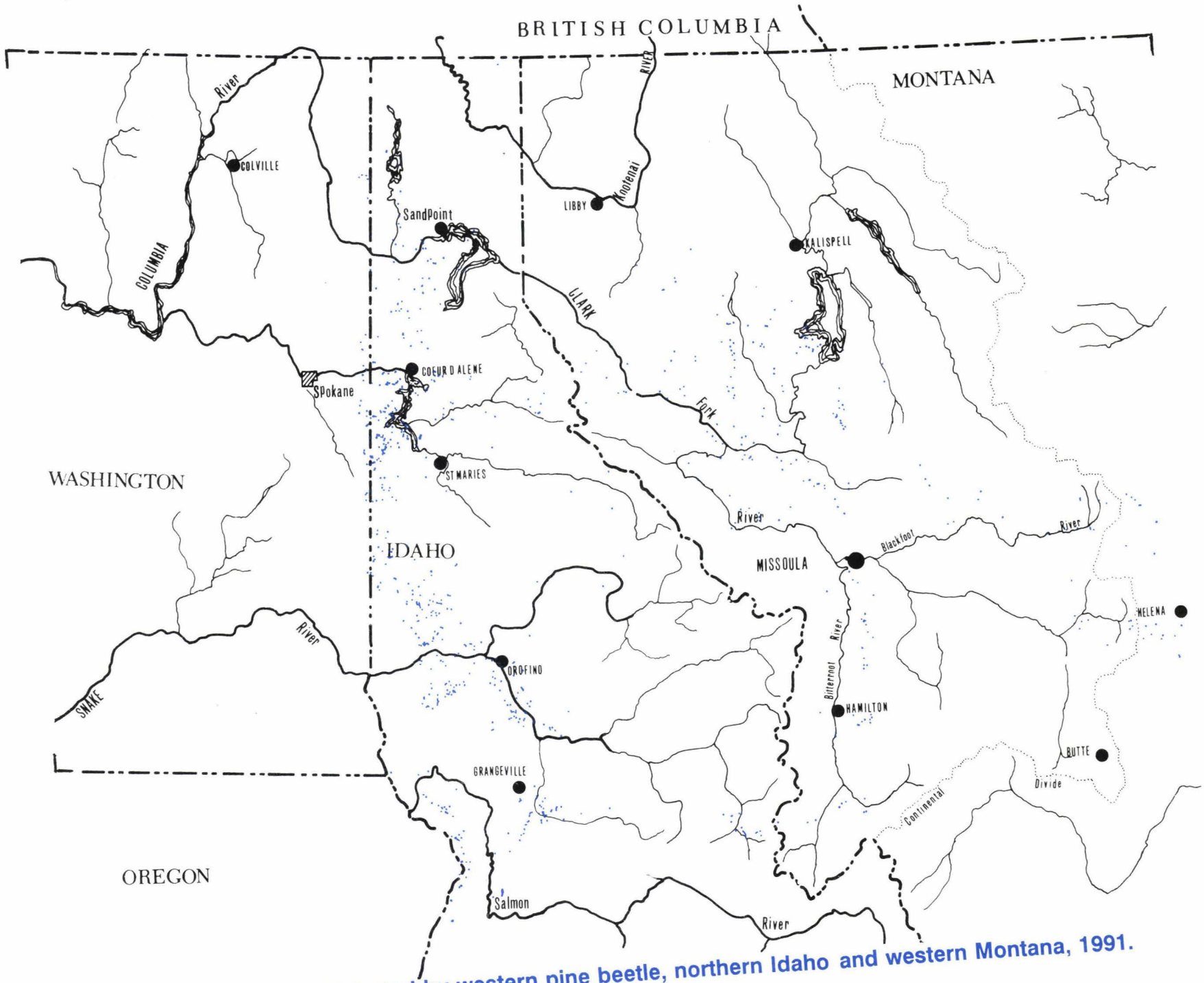

Figure 16.--Areas infested by western pine beetle, northern Idaho and western Montana, 1991.